IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

HEENAN, Sidney A., et al.

Serial No.: 09/453,327

Filed: December 2, 1999

For: RETROREFLECTIVE ARTICLES HAVING MICROCUBES, AND TOOLS AND METHODS FOR FORMING MICROCUBES

Examiner: J. Phan
Art Unit: 2872

DECLARATION OF PAUL W. DEUTER UNDER 37 C.F.R. § 1.132

I, Paul W. Deuter, do declare and state as follows:

1. I was employed by Stimsonite Corporation and its various predecessors-in-interest from 1950 to 1997. Stimsonite Corporation was acquired by Avery Dennison Corporation in about July, 1999, and Avery Dennison has continued the business of Stimsonite Corporation. For the sake of simplicity, throughout this Declaration I will refer to the company that employed me as "Stimsonite," without regard to the time frame of the events discussed herein.

2. Throughout my employment, Stimsonite Corporation was and is in the business of developing, manufacturing, and selling a variety of retroreflective products based on cube corner technology. A "retroreflector" is a reflector that generally reflects light back to the source of the light. A cube corner is a structure formed by three mutually perpendicular faces that intersect

one another to form a corner. Incoming light that hits any one of the three faces is reflected to the other two faces and then back in the direction of the source of the light.

3. Over the years, Stimsonite products based on cube corner technology have included bicycle reflectors, automobile taillights, retroreflective strips and other shapes for mounting on the sides of trucks, trains, and automobiles, retroreflective buttons for use in the manufacture of highway signs, retroreflective reflectors for use on road barriers, retroreflective lenses for pavement markers, and the like. These products are all based on relatively large (macro) cube corners. About twenty years ago Stimsonite also developed a technique for embossing very small (micro) cube corners onto rolls of flexible plastic sheeting. This retroreflective sheeting is used in the manufacture of highway signs and other safety products.

4. Tooling for macro-sized cube corner retroreflectors started with 3-foot lengths of metal wire, slightly larger than 3/32 of an inch in diameter. The wire was drawn to be hexagonal in cross-section, measuring 3/32 of an inch across the flats. The drawn wire was cut into 1-5/8" lengths to make pins. A cube corner was precisely ground on one end of each pin, and the three surfaces of the cube corner are highly polished and flat. Groups of such pins were bundled together so that their cube corner tips were all in a desired surface. A 1925 patent to J.C. Stimson, U.S. 1,591,572, attached hereto as Exhibit A, illustrates an early use of a pin bundle to mold cube corner surfaces into molten glass. As the technology advanced, such bundled pins were used to form a mold, which mold could then be used to mass produce plastic retroreflective parts.

5. Throughout my career at Stimsonite, I worked on the design, development, and manufacturing of tooling for use in manufacturing Stimsonite cube corner retroreflective products other than sheeting, that is, I worked on tooling for those Stimsonite products that used macro-sized cube corner elements. I was responsible for making the pins, assembling them in an appropriate fixture to create a desired configuration of cube corner elements, and creating one or more electroforms of the assembled cube corner element configuration. I would then deliver the electroforms to my co-worker, Mr. Anthony Montalbano. Mr. Montalbano used the electroforms to create molds for the manufacture of production parts. I spent my entire career in the tooling department of Stimsonite, and I was head of that department for thirty-five years, from 1962 until my retirement. As part of my responsibilities, I kept abreast of developments in the pin-making and tool-making arts.

6. At Stimsonite, our standard size for hexagonal macro-sized cube corners was about 3/32 inches across flats. We machined, lapped, and polished cube corners into the ends of the pins, bundled the pins into a desired assembly, and produced molds from the assemblies for use in the mass production of the various Stimsonite molded plastic reflector products. The size of the pins determined in part the minimum thickness of the ultimate molded plastic reflector product. The molded reflector had to be thick enough to accommodate the height of the cube corners, plus at least 50% more. If we had been able to use smaller cube corner elements, we would have been able to manufacture thinner parts, with corresponding cost savings on the amount of material used. We also would have been able to make flexible retroreflective products.

7. In about the middle to late 1960's a technique was developed by Mr. Kenneth Uding that enabled the use of square pins as small as 0.04 inches across flats, less than half the size of our 3/32 inch hexagonal pins. The 0.04 inch square pins were the lowest practical limit we could obtain using pin technology. Stimsonite used these pins in the 1960's to make reflective plastic strips intended to be mounted to the sides of automobiles and trucks.

8. Attached as Exhibit B is a copy of U.S. Patent No. 4,208,090 ("the Heenan '090 patent"), issued to Sidney A. Heenan and assigned to Amerace Corporation. Amerace Corporation is a predecessor-in-interest of Stimsonite. The Heenan '090 patent states on its face that it issued on June 17, 1980, as a continuation of a parent application originally filed on March 24, 1967.

9. Mr. Heenan, now deceased, was an engineer at Stimsonite for over 50 years. He specialized in cube corner retroreflective technology, and he designed many new cube corner retroreflective products. He was the inventor of the first successful retroreflective cube corner highway marker. Mr. Heenan was a named inventor on many U.S. patents related to road markers and other cube corner retroreflective products. I worked closely with Mr. Heenan throughout my career at Stimsonite. It was my job as head of the tooling department to supervise the manufacture of the tooling, including the pins, that would be used in the manufacture of retroreflective products that Mr. Heenan designed.

10. I understand that the Heenan '090 patent describes retroreflective products comprising a plurality of hermetically sealed cells with four retroreflective square cube corner elements arranged in a square pattern in each cell. I understand that the retroreflective product

illustrated in Figures 1-8 of the Heenan '090 patent is a retroreflective lens for a roadway marker. I recall making tooling for use in the manufacture of a product such as is generally illustrated in those figures. The Heenan '090 patent states at column 5, lines 64-66 that the major dimension of each of the cells is no greater than about 0.35 inch, and further states at column 7, lines 15-23 that in a "typical construction" the length of each of the cells is 0.08 inches. This corresponds to the width of each cube corner element being 0.04 inches. This is consistent with my recollection that 0.04 inch pins were the smallest pins that we could use to make tooling for cube corner elements.

11. I understand that Figs. 9-12 of the Heenan '090 patent illustrate another embodiment of Mr. Heenan's invention. Beginning at column 8, line 4, this embodiment is described as a retroreflective sheet from which letters can be cut for use in the manufacture of a sign such as a STOP sign. (This "sheet" described in the '090 patent is not the same product as the flexible "sheeting" that Stimsonite developed in the 1980's.) The retroreflective sheet of the '090 patent is also described as having cells, with four cube corner retroreflector elements in a square configuration in each cell. Because this sheet is to be cut into letters, however, the sheet is described as being even thinner than the plastic pavement marker lenses illustrated in Figs. 1-8. At column 10, lines 7-9, the '090 patent states that in a "typical construction" the sheet has a thickness of only 0.025 inches between front face 402 and rear face 403. At column 10, lines 12-13, the '090 patent states that the length of the side of each cell is 0.04 inch. This means that each cube corner element would be 0.02 inch across flats.

12. I am not aware that Stimsonite ever made a retroreflective sheet product having the cube corner and cell dimensions such as are described in column 10 of the Heenan '090

patent, even experimentally. I do not believe that Stimsonite ever made or used pins that were 0.02 inch across flats. If Stimsonite had made such a product, I would have known about it in my capacity as head of the tooling department.

13. I believe that the Heenan '090 patent does not teach one skilled in the tool making arts how to make a retroreflective article having the cube shape, cube dimensions, and other dimensions described in column 10, lines 5-22 of the Heenan '090 patent, and I believe it was not possible to make such an article, using pin technology. That is because the 0.040 inch width of the square pins that were used in the reflector structures for the highway marker lenses was the lowest practical limit that we had achieved.

14. I recall that during the mid to late 1960's we made square pins that were 0.040" inches across flats. We started with standard hexagonal pins that were 3/32 inches across flats, and ground and polished cube corner faces into the ends of the pins. We then ground material away from the sides of the pins such that the finished pins were square in cross-section and 0.040 across flats. These were the smallest pins that were ever made at Stimsonite for standard production parts.

15. I recall an experiment that we tried in about the same time frame. We made a retroreflective letter "P" such as for use in a "STOP" sign. This retroreflective structure was made using 0.04 inch pins, bundled in cells containing 30 pins each. This was a very expensive way to make this product because such a large number of pins were required; therefore this method was not practical. We abandoned this experiment.

16. To the best of my recollection, our work with the 0.04 inch square pins and with the letter "P" was done in the middle to late 1960's. I note that the application for the Heenan '090 patent was filed in 1967. I do not know if any of that work is what Mr. Heenan intended to describe in columns 8-10 of his '090 patent. I do not know what actual products or experimental work Mr. Heenan was referring to in columns 8-10 of his patent, nor do I know why that portion of the description was included.

17. The undersigned being hereby warned that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S.C. 1001, and that such willful false statements may jeopardize the validity of the application or any resulting patent, declares that the facts set forth in the declaration are true; all statements made of his own knowledge are true; and all statements made on information and belief are believed to be true.

Further declarant sayeth not.

Paul W. Deuter

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Date: 4/5/2001